Design of a Navigation and Guidance System of Missile with Trajectory Estimation Using Ensemble Kalman Filter Square Root (EnKF-SR)

Teguh Herlambang

Department of Information System Nahdlatul Ulama Surabaya University, UNUSA

Surabaya, Indonesia

teguh@unusa.ac.id

Abstract

This paper is the study on the development of navigation and guidance system for a missile. The development begins by determining the trajectory of missile which is the basic need to know where the missile shall be directed. Then the trajectory is used as a guidance so that the missile can reach the targets according to the given trajectory. The Ensemble Kalman Filter with a square root scheme (EnKF-SR) for the estimation of missile trajectory are applied to keep the missile on the trajectory track. The implementation of EnKF-SR algorithm on the Missile model is carried out by establishing two simulations, namely by generating
150 and 250 ensembles, respectively. The simulations exhibit that the generation of 250 ensembles will give more accurate results in comparison to the generation of 150 ensembles. Furthermore, the best simulation yields the tracking accuracy between the real and simulated trajectories is in the order of 99 %.

Keywords; Navigation and Guidance system, Missile trajectory, Ensemble Kalman Filter Square Root, Trajectory Estimation.